Childhood myocerebrohepatopathy spectrum

Childhood myocerebrohepatopathy spectrum, commonly called MCHS, is part of a group of conditions called the POLG-related disorders. The conditions in this group feature a range of similar signs and symptoms involving muscle-, nerve-, and brain-related functions. MCHS typically becomes apparent in children from a few months to 3 years old. People with this condition usually have problems with their muscles (myo-), brain (cerebro-), and liver (hepato-).

Common signs and symptoms of MCHS include muscle weakness (myopathy), developmental delay or a deterioration of intellectual function, and liver disease. Another possible sign of this condition is a toxic buildup of lactic acid in the body (lactic acidosis). Often, affected children are unable to gain weight and grow at the expected rate (failure to thrive).

Additional signs and symptoms of MCHS can include a form of kidney disease called renal tubular acidosis, inflammation of the pancreas (pancreatitis), recurrent episodes of nausea and vomiting (cyclic vomiting), or hearing loss.

Frequency
The prevalence of childhood myocerebrohepatopathy spectrum is unknown.

Causes
MCHS is caused by mutations in the POLG gene. This gene provides instructions for making one part, the alpha subunit, of a protein called polymerase gamma (pol γ).

Pol γ functions in mitochondria, which are structures within cells that use oxygen to convert the energy from food into a form cells can use. Mitochondria each contain a small amount of DNA, known as mitochondrial DNA (mtDNA), which is essential for the normal function of these structures. Pol γ "reads" sequences of mtDNA and uses them as templates to produce new copies of mtDNA in a process called DNA replication.

Most POLG gene mutations change single protein building blocks (amino acids) in the alpha subunit of pol γ. These changes result in a mutated pol γ that has a reduced ability to replicate DNA. Although the mechanism is unknown, mutations in the POLG gene often result in fewer copies of mtDNA (mtDNA depletion), particularly in muscle, brain, or liver cells. MtDNA depletion causes a decrease in cellular energy, which could account for the signs and symptoms of MCHS.
Inheritance Pattern

This condition is inherited in an autosomal recessive pattern, which means both copies of the gene in each cell have mutations. The parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but they typically do not show signs and symptoms of the condition.

Other Names for This Condition

- MCHS

Diagnosis & Management

Genetic Testing Information

- What is genetic testing?
  /primer/testing/genetictesting
- Genetic Testing Registry: Progressive sclerosing poliodystrophy

Research Studies from ClinicalTrials.gov

- ClinicalTrials.gov
  https://clinicaltrials.gov/ct2/results?cond=%22childhood+myocerebrohepatopathy+ spectrum%22+OR+%22Mitochondrial+Diseases%22

Other Diagnosis and Management Resources

- GeneReview: POLG-Related Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK26471
- United Mitochondrial Disease Foundation: Getting a Diagnosis
  https://www.umdf.org/what-is-mitochondrial-disease/getting-a-diagnosis/

Additional Information & Resources

Health Information from MedlinePlus

- Encyclopedia: Lactic Acidosis
  https://medlineplus.gov/ency/article/000391.htm
- Health Topic: Genetic Brain Disorders
  https://medlineplus.gov/geneticbraindisorders.html
- Health Topic: Liver Diseases
  https://medlineplus.gov/liverdiseases.html

Additional NIH Resources

- National Institutes of Health Rare Diseases Clinical Research Network: North American Mitochondrial Disease Consortium
  https://www.rarediseasesnetwork.org/cms/NAMDC
Educational Resources

• MalaCards: childhood myocerebrohepatopathy spectrum
  https://www.malacards.org/card/childhood_myocerebrohepatopathy_spectrum

• Mayo Clinic: North American Mitochondrial Disease Consortium Patient Registry and Biorepository (NAMDC)
  https://www.mayo.edu/research клинических-исследований/cls-20409244

Patient Support and Advocacy Resources

• American Liver Foundation: The Progression of Liver Disease
  https://liverfoundation.org/for-patients/about-the-liver/the-progression-of-liver-disease/

• MitoAction
  https://www.mitoaction.org/

• Muscular Dystrophy Association: Mitochondrial Myopathies
  https://www.mda.org/disease/mitochondrial-myopathies

• United Mitochondrial Disease Foundation: What is Mitochondrial Disease?
  https://www.umdf.org/what-is-mitochondrial-disease/

Clinical Information from GeneReviews

• POLG-Related Disorders
  https://www.ncbi.nlm.nih.gov/books/NBK26471

Scientific Articles on PubMed

• PubMed
  https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28POLG%5BTIAB%5D %29%5D+AND+mtDNA+depletion%5BTIAB%5D%29%29+AND+english%5Bla %5D+AND+human%5Bmh%5D+AND+%22last+3600+days%22+AND+5Bdp%5D

Sources for This Summary

  
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